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PointScan/100 Series
User's Manual

Ethernet Distributed I/O

the smart approach to instrumentation ™

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PointScan/100 Series
User's Manual

Ethernet Distributed I/O

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IOtech has maintained ISO 9001 certification since 1996. Prior to shipment, we thoroughly test our products and review our documentation to assure the highest quality in all aspects. In a spirit of continuous improvement, IOtech welcomes your suggestions.

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All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.

WARNING – EXPLOSION HAZARD – WHEN IN HAZARDOUS LOCATIONS, DISCONNECT POWER BEFORE REPLACING OR WIRING MODULES.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Note: Refer to the IO Toolkit software's online help for product specifications and configuration settings.

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Table of Contents

1 - General Information

Overview 1-1
General Specifications 1-1
I/O Module Components 1-2
DC Power Overview 1-2
PointScan/100 LEDs 1-3
I/O Module Status LED 1-3
Status LED Wink Feature 1-3
Isolation 1-4
Local Diagnostics 1-4
Hot Swap Feature 1-4
Calibration 1-4
Getting Started 1-5
❶Mount the Hardware 1-5
❷Install Ethernet/RS485 Wiring Between Modules 1-5
❸Connect Power and I/O Wiring to the Modules 1-5
❹Install Communication Cabling 1-5
❺ Apply Power 1-5
❻ Configure Using IO Toolkit 1-5
❼ Test the System 1-5
❽ Configure Your Computer 1-5
❾ Run the Software 1-5
❿ If You Have Difficulty 1-5

2 - Ethernet, RS485 Wiring

Ethernet Wiring Guidelines 2-1
RS485 Wiring Guidelines 2-1
PointScan/100 Series Panel Assembly 2-2
Dimmension Drawings 2-3
Screw Torque 2-3

3 - Configuring PointScan/100 I/O

PointScan/440 **Remote I/O Setup Module Overview** ***..... 3-1***
RS232 Wiring 3-1
RS232 Mode Selection 3-2
IO Toolkit 3-2

4 - Discrete I/O Modules

PointScan/129 **8 Discrete Inputs and 8 Discrete Outputs** ***..... 4-1***
Overview 4-1
Wiring and Jumpers 4-1
TPO Feature 4-1
PointScan/122 **16 Discrete Inputs** ***..... 4-2***
Overview 4-2
Wiring and Jumpers 4-2
I/O Registers 4-2
PointScan/127 **High Speed Counter Module** ***..... 4-3***
Overview 4-3
Input Wiring 4-3
I/O Registers 4-3

5 - Discrete Output Modules

PointScan/142 **High Density Discrete Output Module** ***..... 5-1***
Overview 5-1
Wiring 5-1
TPO Feature 5-1
I/O Registers 5-1

6 - Discrete / Analog Modules

PointScan/130 **8 Discrete Inputs and 8 4-20 mA Inputs** ***..... 6-1***
Overview 6-1
Wiring and Jumpers 6-1
Current Shunts 6-1
I/O Registers 6-1
PointScan/109 **4 RTD Inputs and 4 Discrete Inputs** ***..... 6-2***
Overview 6-2
Wiring and Jumpers 6-2
I/O Registers 6-2

7 - Analog Input Modules

PointScan/102 **High Density 4-20 mA Analog Input Module** ***..... 7-1***
Overview 7-1
Wiring 7-1
Current Shunts 7-1
I/O Registers 7-1
PointScan/104 **Instrumentation Analog Input Module** ***..... 7-2***
Overview 7-2
Wiring 7-2
4-20 mA Input Jumpers 7-2
Current Shunts 7-2
I/O Registers 7-2

8 - Analog I/O Module

PointScan/108 **Combined Analog Input and Output Module** ***..... 8-1***
Overview 8-1
Wiring 8-1
I/O Registers 8-1

Appendix A – Table of PointScan I/O Modules and Accessories

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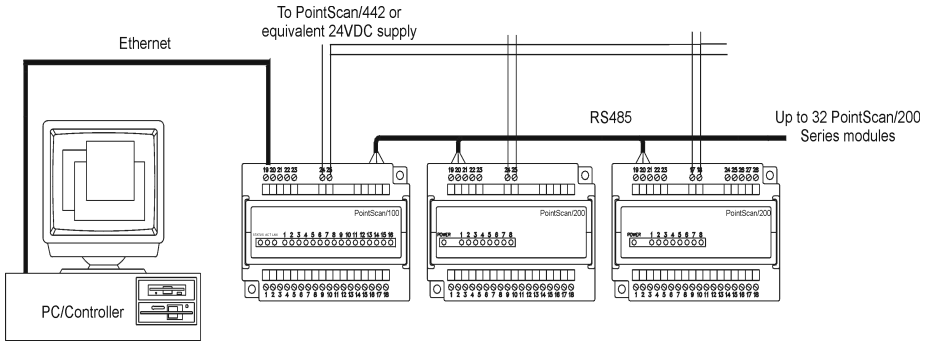
General Information 1

Overview

This manual will help you install and maintain PointScan/100 I/O modules. In summary, wiring for power, communications and I/O is connected to each module's base. Then, setup choices are entered using the IO Toolkit software and the system will be ready to run. Shown below are some typical system configurations using PointScan/100 I/O:



Using Ethernet based PointScan/100 I/O with (RS485) PointScan/200 expansion I/O

General Specifications

These general specifications apply to all PointScan/100 I/O modules. More detailed product specifications may be found in the online help system of the IO Toolkit configuration software.

Supply Voltage	10 - 30 VDC, 1.2 Watt typical per module (48 mA @ 24 VDC – varies by module and load).
RS485 Expansion	Connect up to 32 PointScan/200 modules or Modbus devices using RS485
Ethernet Isolation	1200 Volts RMS (for 1 minute)
Operating Temperature	-30 to 70 °C
Storage Temperature	-40 to 85 °C
Humidity	5 to 95% (non-condensing)

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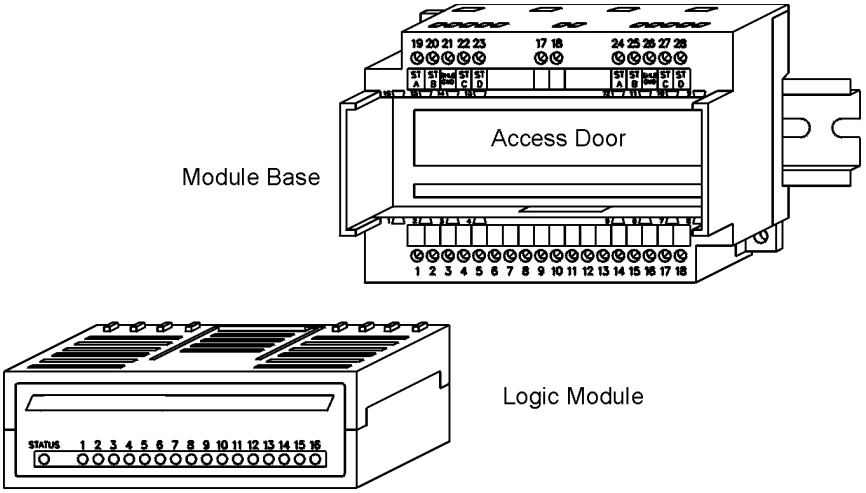
I/O Module Components

A PointScan/100 Series I/O module consists of a base assembly and a removable logic module. All base assemblies have a hinged door that is accessible when the logic module is removed. In 4-20 mA analog input modules (PointScan/102, /104, /108, and /130) the hinged door provides access to jumpers and/or 100 ohm replaceable shunts.

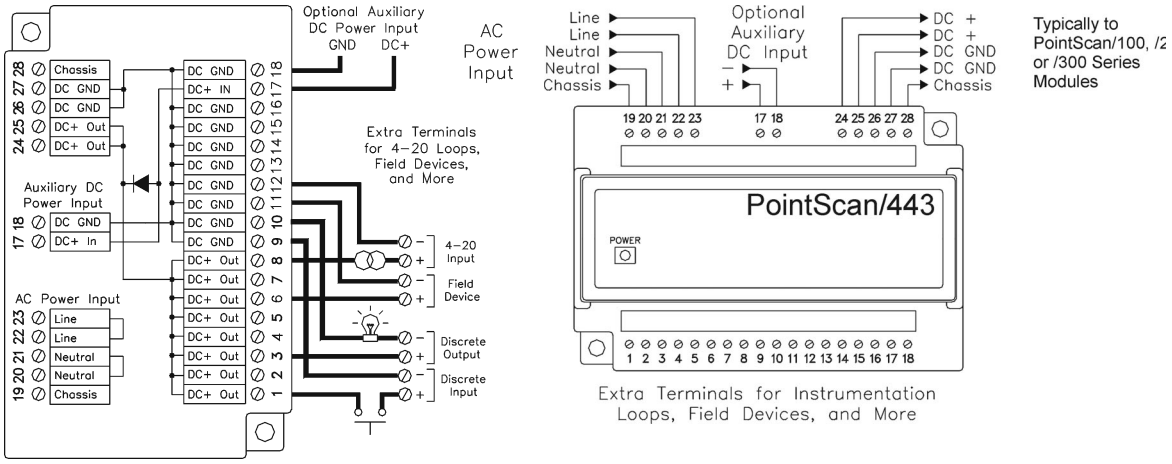
A logic module may be removed by lightly squeezing the top and bottom locking tabs and pulling the logic module straight out. To reinstall, insert the logic module into the base and press firmly until it snaps into place. The logic module is fully seated when the innermost row of ventilation slots are just covered by the top surface of the base cover.



DC Power Overview

PointScan/100 modules can be powered from the same DC source that is used to power your I/O devices. No separate power supply is required. Typically, 10 to 30 VDC power is applied to terminals 24 and 25 on the base of each module.

The PointScan/443 is used to power up to seven PointScan modules of any type, instrumentation loops, and other devices. It operates on 85-264 VAC (47-63 Hz) or 120-370 VDC and outputs 24 VDC at up to 1 A. Refer to the figure below for the proper power connections.



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DC Power Wiring PointScan/443

PointScan/442 gateways, and user instrumentation loops may be powered from the PointScan/443 power supply. The PointScan/443 supplies 24 volts DC at a maximum of two amps.

DC Power Wiring (User DC Source)

PointScan/442 gateways, and user instrumentation loops may be powered from a single DC source. The user DC power source must be between 18 to 30 volts.

Current Requirements

To calculate the current requirements, add the wattage required for the I/O modules in use, then divide the total wattage by the DC power source voltage. Then add any current needed for user instrumentation loops.

PointScan/100 LEDs

Every PointScan/100 module has a number of LEDs. These LEDs can be useful for system diagnostics. These LEDs can be observed in the following states:

I/O Module Status LED

On, with a quick "OFF" BLINK [Long Blink](1.9 seconds ON, .1 seconds OFF) - The module is configured and fully operational, but has not received a valid request from the host for a time longer than the specified time out period. A communication time out has occurred.

Full ON [On] **-** The module is configured, fully operational, and has received communication from the host device before the timeout period expired. **This is the desired LED indication during system operation.**

HALF BLINK [Long Blink] (1 second ON, 1 second OFF) - The module is not adequately configured and requires a download from the IO Toolkit program.

Full OFF [Off] **-** There is no power to the module, or the status LED is being turned off intentionally by the IO Toolkit during the module loading operation.

Off, with a quick "ON" BLINK [Short Blink] (1.9 seconds OFF, .1 seconds ON) - The module failed self-test at initialization. It will not attempt communication and should be replaced.

Status LED Wink Feature

The "Status" LED may be intentionally winked (10 blinks/second) by the IO Toolkit program to visually identify the module when other modules are present.

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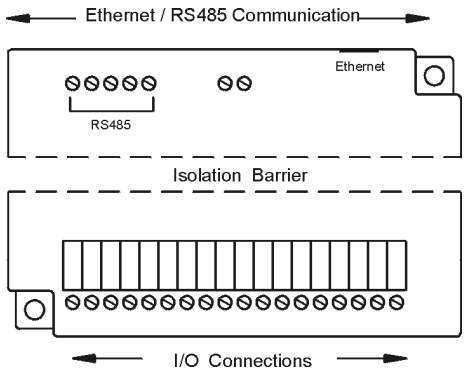
Isolation

Every PointScan/100 Series I/O module is isolated from ground and other modules for fault-free operation. Additional levels of isolation (e.g. 500V channel to channel isolation) are provided with some modules. Refer to the product specifications in the IO Toolkit online help system for more information.



Local Diagnostics

Local diagnostics can be performed through any available port while the gateway is responding to messages from the other port. Diagnostic software, such as IO Toolkit, can be used to display the status of the I/O registers.

Hot Swap Feature

I/O modules may be unplugged from their bases, even in live systems. PointScan/100 Series I/O modules automatically self-configure from system memory. Analog I/O logic modules will automatically upload and self-adjust to user calibration settings (if any are present) from the module base.

Calibration

All PointScan/100 Series analog I/O logic modules are factory calibrated over all supported ranges using a regularly maintained set of standards. Factory calibration data is stored in permanent memory in the logic module, and cannot be altered. User recalibration may be performed, but is necessary only if inaccuracy in your field device is observed, or if any of the 100 ohm input shunts are replaced with low tolerance resistors.

Each analog channel has span and offset calibration settings. Span is the "range" or "gain" of the channel. Offset is the "zero" setting. Each reported analog I/O value is the product of the factory calibration value times the user calibration value. The user calibration value is defined as:

(user span value * raw value) + user offset

The user span is a unity value (1) by default. The user offset is zero by default.

Note: All factory and user calibrations are performed in software. There are no adjustment potentiometers inside the logic modules.

User calibrations are performed using the IO Toolkit utility. Refer to the IO Toolkit on-line help system for information on calibrating PointScan/100 Series analog I/O.

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Getting Started

Following these steps will make installation and start-up easier.

❶Mount the Hardware

Refer to Section 2 for installation instructions for PointScan series I/O and optional accessories

❷Install Ethernet/ RS485 Wiring Between Modules

Make PT-Bus (PointScan/300) or RS485 (PointScan/200) wiring connections the modules.
Refer to Section 2 for wiring guidelines.

❸Connect Power and I/O Wiring to the Modules

Connect AC power to the PointScan/442 power supply. Make DC power connections from the power supply to the I/O modules and optional accessories (as needed.) Make field wiring connections to the PointScan/100 Series I/O modules and any peripheral equipment.
Refer to the individual module sections in this manual for connection details.

❹Install Communication Cabling

For PointScan/100 Series modules connect the Ethernet Cable (RJ45) to the resident connecter.

For PointScan/200 Series modules connect the Twisted Pair (RS485) cabling.

Refer to Chapter 2 for wiring details.

❺ Apply Power

Power up the PointScan/100 Series I/O and related peripherals. Observe the status LED on each module. The normal conditions are as follows:

Module Type	***LED, Normal Indication***
PointScan/442 Power Supply	Power LED On
PointScan/100 Series	Status LEDs Blinking

❻ Configure Using IO Toolkit

Refer to chapter 3, *IO Toolkit* and the steps outlined in the online help for each PointScan/100 Series module.

❼ Test the System

Use the Test I/O window in the IO Toolkit program to verify proper I/O operation in all PointScan/100 Series module.

❽ Configure Your Computer

Refer to the on-line help in the IO Toolkit for more information.

❾ Run the (Citec) Software

Refer to the on-line help in the Citec software for more information.

❿ If You Have Difficulty

If you experience startup trouble, contact IOtech at productsupport@iotech.com.

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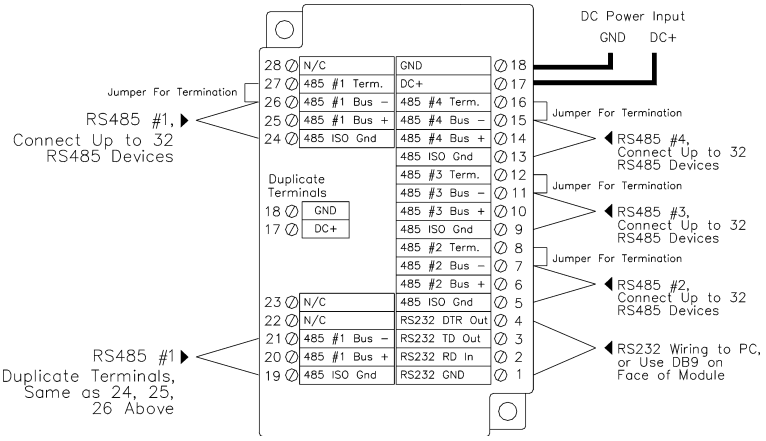
Ethernet, RS485 Wiring 2

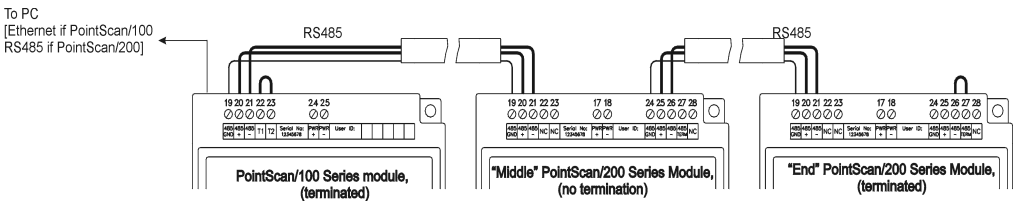
Ethernet Wiring Guidelines

PointScan/100 I/O modules communicate with a master device (PC) using 10BaseT Ethernet media. Electrical isolation is provided on the Ethernet port for increased reliability. Follow normal Ethernet wiring practices when installing PointScan/100 I/O modules.

RS485 Wiring Guidelines

PointScan/100 I/O modules also feature an RS485 port for I/O expansion via PointScan/200 I/O modules. The RS485 party-line consists of two wires and an isolated ground wire. It is recommended that the ground wire be connected to all stations to provide a common return. The RS485 port on all PointScan/100 modules is isolated from its internal circuitry, local power source, and I/O wiring to improve communications reliability. It is recommended that only 32 PointScan/200 or PointScan/100 modules (Configured for RS485 communication) be connected on any RS485 party-line, and that the termination jumper be installed on the last module on each end of the RS485 network. Limiting the cabling to two network arms (segments) radiating from the master controller will yield the best signal results.


DC Power Input
GND
DC+
Jumper For Termination
RS485 #1, Connect Up to 32 RS485 Devices
Duplicate Terminals
RS485 #1 Duplicate Terminals, Same as 24, 25, 26 Above
RS485 #4, Connect Up to 32 RS485 Devices
RS485 #3, Connect Up to 32 RS485 Devices
RS485 #2, Connect Up to 32 RS485 Devices
RS232 Wiring to PC, or Use DB9 on Face of Module
28 N/C
27 485 #1 Term.
26 485 #1 Bus –
25 485 #1 Bus +
24 485 ISO Gnd
18 GND
17 DC+
23 N/C
22 N/C
21 485 #1 Bus –
20 485 #1 Bus +
19 485 ISO Gnd
GND 18
DC+ 17
485 #4 Term. 16
485 #4 Bus – 15
485 #4 Bus + 14
485 ISO Gnd 13
485 #3 Term. 12
485 #3 Bus – 11
485 #3 Bus + 10
485 ISO Gnd 9
485 #2 Term. 8
485 #2 Bus – 7
485 #2 Bus + 6
485 ISO Gnd 5
RS232 DTR Out 4
RS232 TD Out 3
RS232 RD In 2
RS232 GND 1



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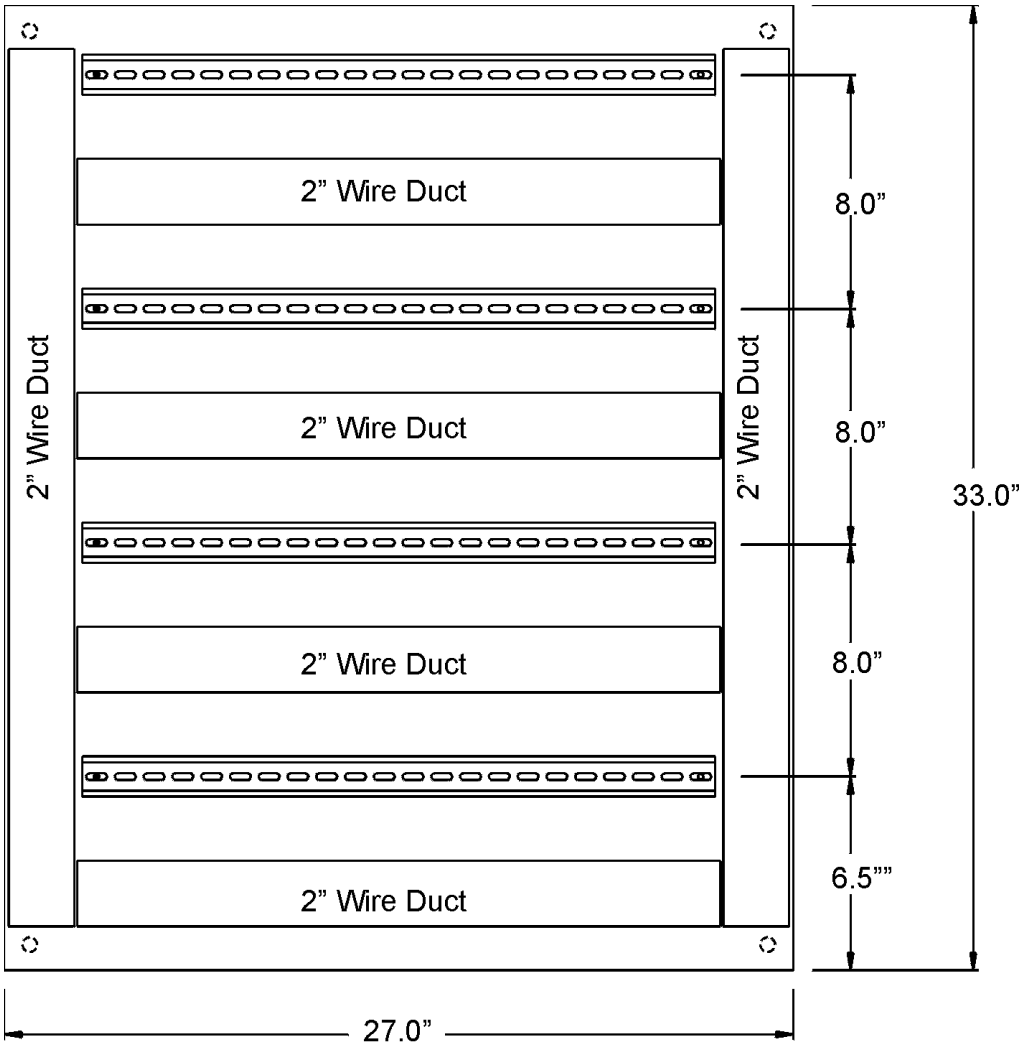
PointScan/100 Series Panel Assembly

PointScan/100 Series I/O snaps onto DIN rail strips fastened to the subpanel. The following figure shows a sample panel with DIN rail strips and wire duct attached. Recommended DIN rail spacing is 8 inches. This spacing allows room for wire duct to be installed without obstructing field wiring installation.

The PointScan/100 Series modules are typically installed against one another, but space may be left between modules to accommodate other DIN rail mounted components such as terminal blocks and fuse holders. End clamps are recommended to restrict side-to-side movement. The figures on this page and the next show the physical dimensions of the PointScan/100 Series components.

PointScan/100 Series modules may be installed in any orientation and order on your panel. The modules are electrically interconnected using RS485 and Ethernet, beginning with the gateway.



Sample Layout For a 36" x 30" Enclosure

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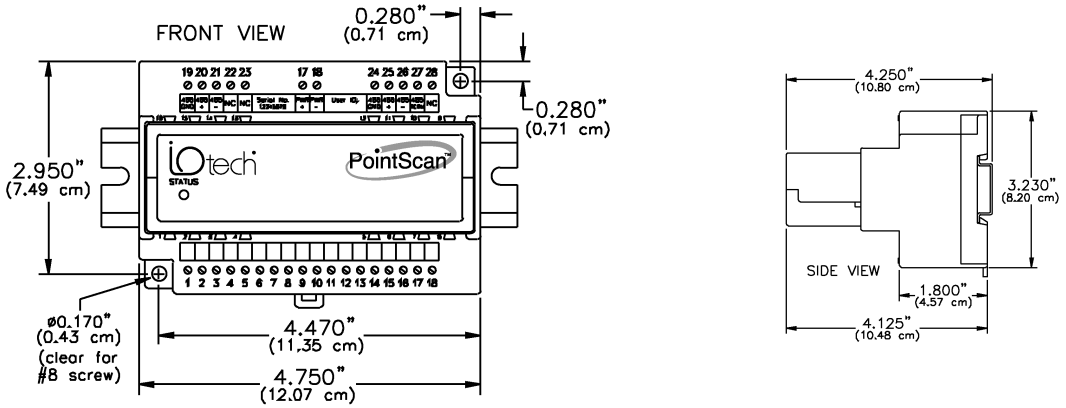
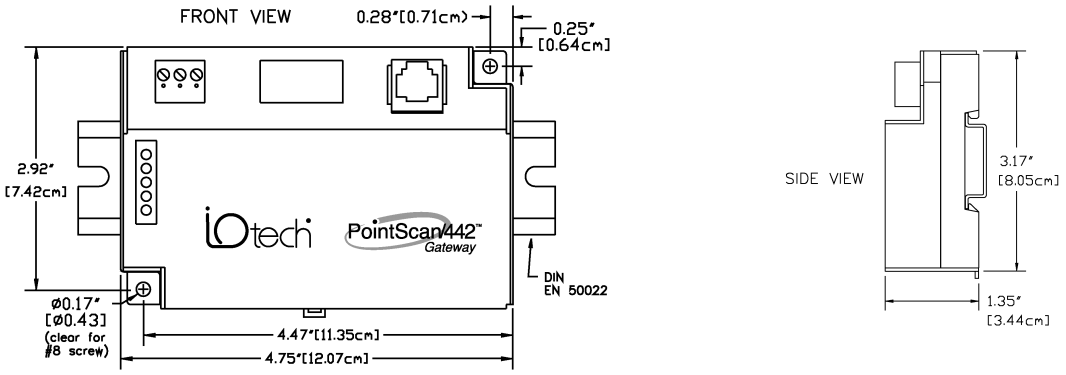
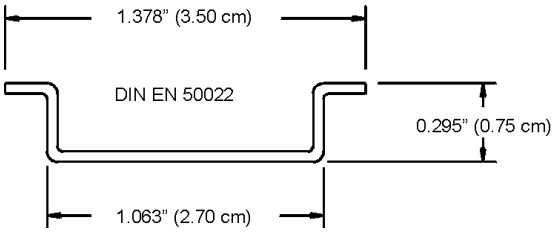


PointScan/100, PointScan/200, PointScan/300 Series I/O modules, PointScan/441 (RS-232/RS-485 Converter), and PointScan/443 (Power Supply) Dimmensions



Gateway Dimensions



DIN Rail Dimensions

DIN EN 50022 Suppliers

Manufacturer	Type
Altech	PR30
Entrelec	TS35
Phoenix	NS35/7.5
Wago	TS35
Weco	H-35
Weidmuller	TS35
Wieland	TS35

Screw Torque

All the screw terminals on the base should be tightened to a maximum of 3.48 in-lbs.

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Configuring PointScan/100 I/O 3

This section documents the following module:
PointScan/440

PointScan/440 Remote I/O Setup Module

Overview

This setup tool is recommended to initially configure each PointScan/100 and/or PointScan/200 module. To use the setup module, simply unplug any PointScan/100 or PointScan/200 module from its base and insert the setup module into the base.

Note: PointScan/100 and PointScan/200 "smart bases" allow hot swap of live modules -- an exclusive IOtech feature that makes it permissible to configure PointScan/100 and PointScan/200 modules in live systems.

The PointScan/100 or PointScan/200 module configuration you created the IO Toolkit program will be written into permanent memory in the module's base. When the PointScan/100 or PointScan/200 module is reinserted into its base, the module will find and upload the configuration information, instantly configure itself and begin scanning I/O.

Once a PointScan/100 or PointScan/200 module has been configured with an appropriate station address and IP address (PointScan/100 only), modified configuration data can be downloaded through the Ethernet port or RS485 port into the module base.

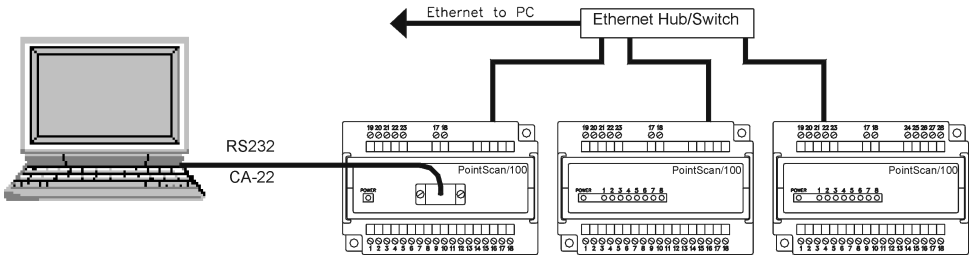
More information on the Remote I/O Setup Module can be found in the online help system of the IO Toolkit.

RS232 Wiring

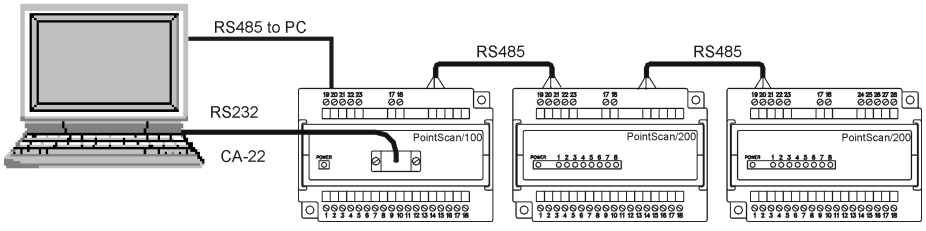
Connect the setup module to your Windows PC using a standard Serial (RS232) cable [CA-22]. Only the transmit (TD), receive (RD) and common return (GND) signals are actively used. The RS232 port on this configuration tool is electrically isolated to protect your computer in the event of field wiring errors. The setup module runs on the DC power connected to terminals 17 and 18 of the module base it is plugged into. No other connections are required. I/O wiring can be left undisturbed.

RS232 Mode Selection

This module always communicates to the host PC at 9600 baud, with no parity and eight data bits. Be sure to select "Use Setup Module's Settings" as the communication device selection in the IO Toolkit program.



PointScan/100 I/O modules only



PointScan/100 I/O with PointScan/200 I/O expansion modules

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IO Toolkit

PointScan/100 or PointScan/200 modules are configured using the IO Toolkit software. Configuration parameters are written over Ethernet, RS485, or RS232 (PointScan/440 module only) into permanent memory in the module's base. Refer to the IO Toolkit help for details.

Here are the basic steps for configuring a PointScan I/O module or PointScan/442 gateway.

1. Connect DC power to the module or gateway.

2. Connect an Ethernet cable to the module / gateway. Use a straight-through cable if you are connecting to an Ethernet hub or switch. Use a cross-wired cable if you are connecting directly to a PC. Make sure the LNK LED on the module/gateway is on solid (not blinking).

3. Run the IO Toolkit. You can use the Plug & Play Wizard to define the parameters for the module / gateway. Be sure to do the following:

   - Choose an IP address that is appropriate for your network. See the help file for details.
   - Enter in the serial number that is printed on a label on the module / gateway.
   - Choose a station (slave) number for the module / gateway that is unique from other modules / gateways and the device you are interfacing to.
   - Select the appropriate RS232 or RS485 com parameters (protocol, baud rate, etc.) to match the device that you are interfacing to.

4. Once you've completed the wizard, save your project file. Go to the Device menu and choose the appropriate communication device. Then go to the Operations menu and select Load. This should set the IP address in the module / gateway and then load down your other parameters.
   If this load fails for some reason, here are some items to check:

   - Make sure the LNK LED is on solid. If it is off or blinking then a typical cause is a bad cable, an incorrect cable, or you are plugged into the wrong port on your hub ./ switch.
   - Try to "ping" the gateway. Ping is a utility that comes with your PC. Start an MSDOS prompt and type "ping" followed by the IP address of the gateway and then hit <CR>.
     For example, "ping 10.1.0.1" (do not type the quotes). If you get an "unknown command" error then you will need to install the TCP/IP Ethernet protocol on your computer. If you get "destination unreachable" then make sure the gateway's IP address is valid with respect to the IP address and subnet mask of your computer. If you get "request timeout" then check all the items above.

     Note: Information on Ethernet networking can be found in the online help system for the IO Toolit.

5. Once you establish that you can communicate with the module / gateway form the IO Toolkit you then should attempt to communicate with your device using your master software (i.e. KepServer or Citect)

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Discrete I/O Modules 4

This section documents the following modules
PointScan/129, PointScan/122, PointScan/127

PointScan/129 8 Discrete Inputs and 8 Discrete Outputs

Overview

This module provides one terminal for each input or output channel. All inputs may be wired as sourcing or sinking. Outputs are wired in a sourcing (power switching) configuration only. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information can be found in the on-line help in the IO Toolkit program.

Number of Channels	**8 discrete inputs, 8 discrete outputs (PointScan/129 only)**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**
Output Voltage Range	**10 – 30 VDC**
Maximum Count Rate	**100 Hz (6000 / minute) each input, plus selectable 2KHz (120,000 / minute) mode for input 1 only**

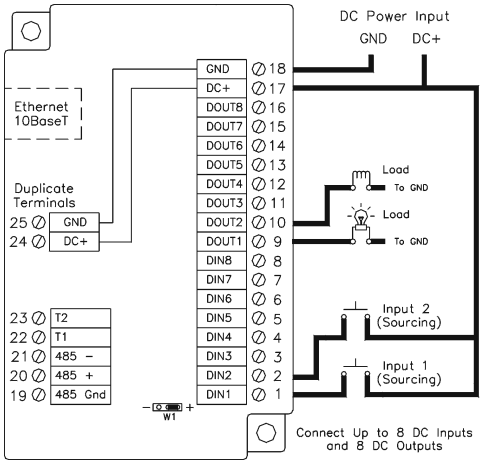
Wiring and Jumpers

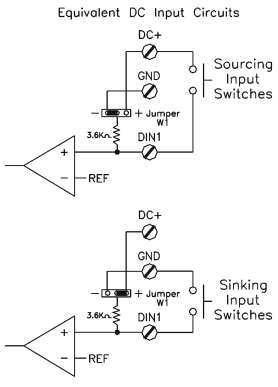
One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sourcing field output and/or or sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the inputs.

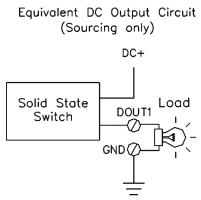
TPO Feature

Time proportioned outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control program. Use the IO Toolkit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be configured as a TPO or ordinary discrete output. I/O Registers

Function	IOtech Registers	Modbus Registers
Discrete Inputs	X0 – X7	10001 – 10008
Discrete Outputs	Y0 – Y7	00001 – 00008
TPO Values	AY0 – AY7	40001 – 40008
Counter Inputs	AX0 – AX7	30001 – 30008







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Overview

This module provides sixteen input channels. Inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the IO Toolkit program.

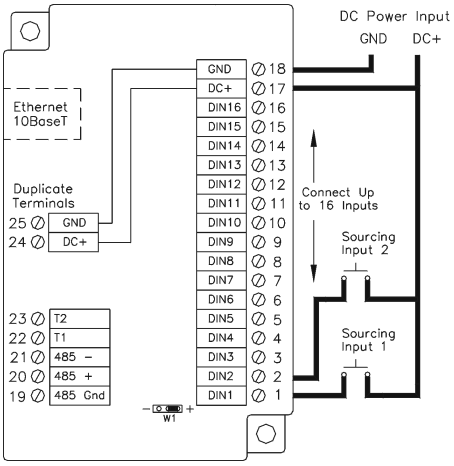
Number of Channels	**16 discrete inputs (connected to a common source)**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

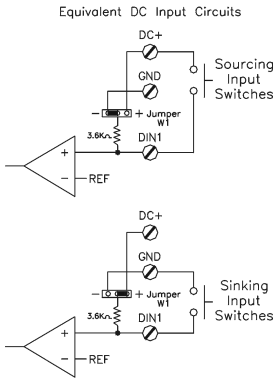
Wiring and Jumpers

Positive DC or AC voltage must be applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the inputs.

I/O Registers

Function	IOtech Registers	Modbus Registers
Discrete Inputs	X0 – X15	10001 – 10016
Counter Inputs	AX0 – AX15	30001 – 30016





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Overview

This high-speed counter module has eight isolated circuits that accept pulse inputs from a variety of sources, including quadrature and incremental encoders. Count values are reported in 16 bit analog input registers or 32 bit long registers. The states of the counter inputs are also reported as discrete inputs. Pulse rates up to 50 kHz are supported. The counters can be reset by toggling discrete output bits. Counter modes are selected using the IO Toolkit program. More information on this and other features can be found in the on-line help supplied with the IO Toolkit program.

Number of Channels	**8 discrete inputs, isolated**
Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

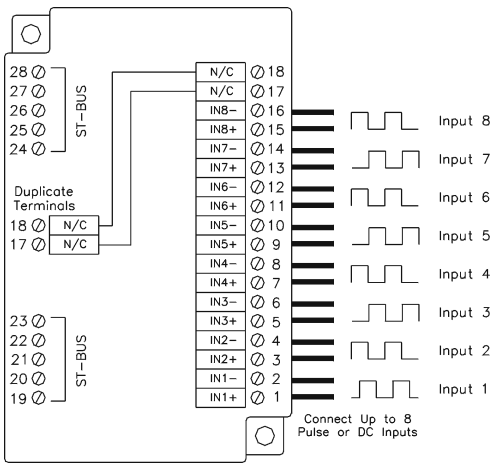
Input Wiring

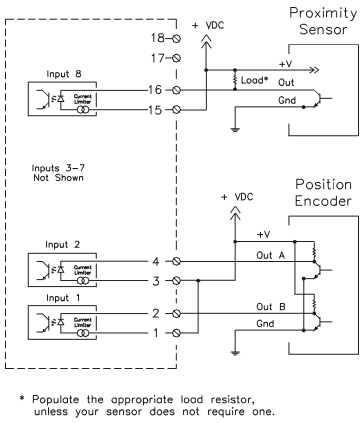
Screw terminal assignments are shown below. For best noise immunity, connect input signals using twisted wire pairs. To maintain the best differential noise rejection, do not connect (-) screw terminals together at the I/O base. Positive DC voltage must be applied to an input to indicate an ON condition. Refer to the wiring diagram below.

Any odd-numbered input can be gated by connecting a gating signal to the next highest even-numbered input. For example, Input 2 can gate the counter for Input 1.

I/O Registers

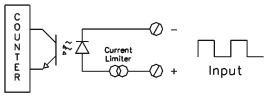
Function	IOtech Registers	Modbus Registers
Discrete Inputs	X0 – X7	10001 – 10008
Counter Inputs	AX0 – AX7 or LI0 – LI7	30001 – 30008
		35001 – 35008
Resets	Y0 – Y7	00001 – 00008



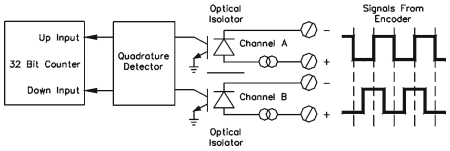


Typical Wiring Models

Typical Count/Rate Input Circuit



Typical Position Input Circuit



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Discrete Output Modules 5

This section documents the following module
PointScan/142

PointScan/142 High Density Discrete Output Module

Overview

Sixteen discrete output channels each provide up to 1 Amp DC to motor contactors, valves, and other loads. Inductive surge protection is provided. Each of the sixteen outputs may optionally be configured as Time Proportioned Outputs that pulse ON at a duty cycle proportional to an analog output register value. Typically these TPO outputs are controlled by a PID loop or other process algorithm in a control program. More information can be found in the on-line help supplied with the IO Toolkit program.

Number of Channels	**16 discrete outputs connected to a common DC source**
Output Voltage Range	**10 - 30 VDC**
Max. Load per Output	**1 Amp**
Max. Load per Module	**8 Amps**
Max. Inrush Current	**5 Amps (for 100 mS)**

Wiring

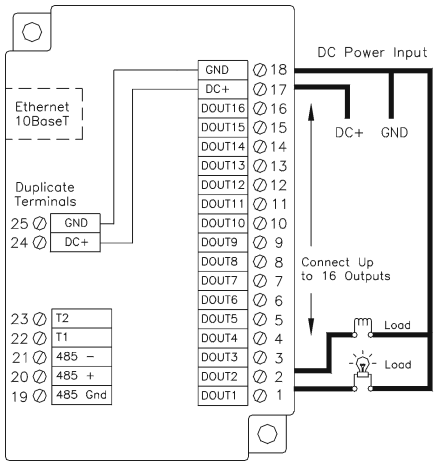
A single terminal is provided for each output channel. All outputs are powered from the DC power terminal. All channels are referenced to a common return, which is connected to the negative side (ground) of the DC power source.

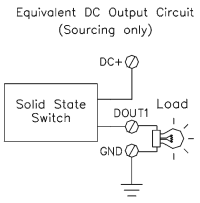
TPO Feature

Time proportioned outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control program. Use the IO Toolkit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be configured as a TPO or ordinary discrete output.

I/O Registers

Function	IOtech Registers	Modbus Registers
Discrete Outputs	Y0 – Y15	00001 – 00016
TPO Values	AY0 – AY15	40001 – 40016





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Discrete / Analog Modules 6

This section documents the following modules:
PointScan/130, PointScan/109

PointScan/130 8 Discrete Inputs and 8 4-20 mA Inputs

Overview

Eight 4-20 mA inputs provide 14 bit analog measurements. Discrete inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the IO Toolkit program.

Number of Channels	**8 analog inputs (14 bit resolution), 8 discrete inputs**
Input Range	**4 - 20 mA (analog), 12/24 VDC/VAC (discrete)**
Analog Input Impedance	**100 ohms Note: input voltage drop = 2 volts at 20 mA**
Discrete Input Voltage Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

Wiring and Jumpers

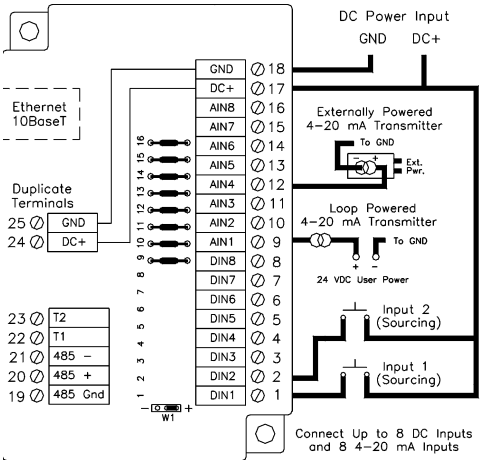
Positive DC or AC voltage must be applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the discrete inputs. A single input terminal is provided for each analog input channel. Care must be taken to externally provide a suitable instrumentation ground for these single ended input circuits.

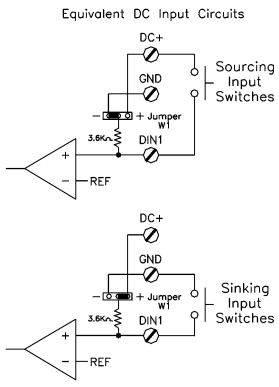
Current Shunts

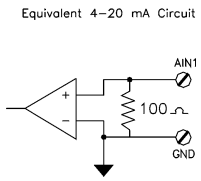
Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open circuits as a result of a current overload.

I/O Registers

Function	IOtech Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008
Discrete Inputs	X0 – X7	10001 – 10008
Counter Inputs	AX8 – AX15	30009 – 30016







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Overview

Four RTD inputs provide 16 bit high resolution analog measurements. Discrete inputs may be wired as all sourcing or sinking. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the IO Toolkit program.

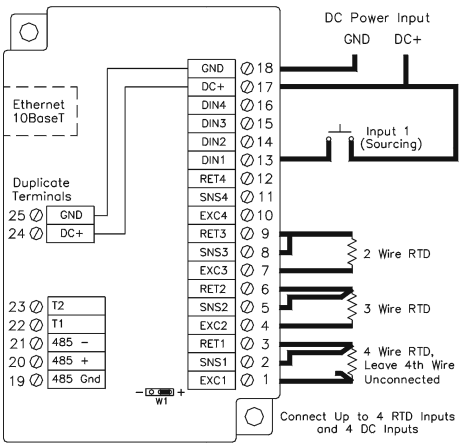
Number of Channels	**4 RTD inputs (16 bit resolution), 4 discrete inputs**
RTD Input Type / Range	**100 ohm platinum, -200 to 850 °C**
Discrete Input Range	**12/24 VDC/VAC**
Input Current @ 24 VDC	**6.7 mA**

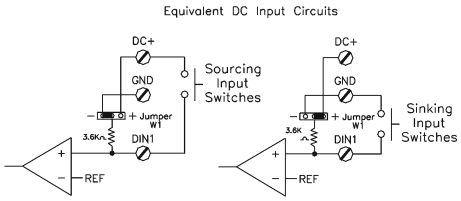
Wiring and Jumpers

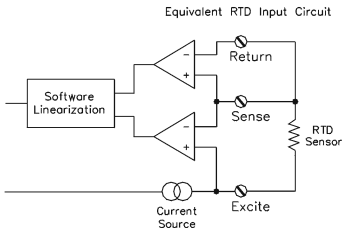
See the wiring diagram below for RTD inputs. Discrete inputs need positive DC or AC voltage applied to an input to indicate an ON condition. All channels are referenced to a common return or supply, which is connected to the negative side (ground) or positive side (DC+) of the DC power source. One wire from each sourcing field input should be bussed together and connected to terminal 17 (DC +). One wire from each sinking field input should be bussed together and connected to terminal 18 (DC GND). Refer to the wiring diagram below. Set jumper W1 to match the wiring configuration of the discrete inputs

I/O Registers

Function	IOtech Registers	Modbus Registers
RTD Inputs	AX0 – AX3	30001 – 30004
Discrete Inputs	X0 – X3	10001 – 10004
Counter Inputs	AX4 – AX7	30005 – 30008







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Analog Input Modules 7

This section documents the following modules:
PointScan/102, PointScan/104

Note: It is not necessary to recalibrate analog I/O if a logic module is replaced.

Analog logic modules may be hot swapped and will not require recalibration. User calibration data is stored in system memory outside of the analog module. Factory calibration data is stored in memory in the plug-in logic module. Since all logic modules are calibrated to the same factory standards, recalibration is not necessary if logic modules are moved or replaced.

PointScan/102 High Density 4-20 mA Analog Input Module

Overview

Sixteen 4-20 mA inputs provide 14 bit high resolution analog measurements. More information can be found in the on-line help supplied with the IO Toolkit program.

Number of Channels	**16 (14 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA

Wiring

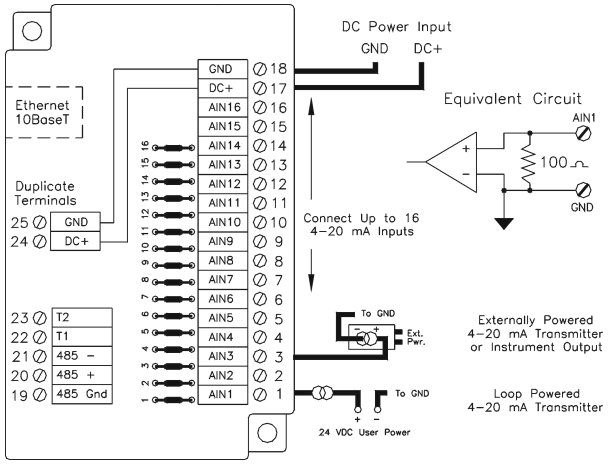
A single input terminal is provided for each measurement channel. Care must be taken to externally provide a suitable instrumentation ground for these single ended input circuits.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open-circuits as a result of a current overload.

I/O Registers

Function	IOtech Registers	Modbus Registers
Analog Inputs	AX0 – AX15	30001 – 30016



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PointScan/104 Instrumentation Analog Input Module

Overview

Eight configurable inputs provide 16 bit high resolution analog measurements. More information can be found in the on-line help supplied with the IO Toolkit program.

Number of Channels	**8 (16 bit resolution)**
Input Range	**0/4 - 20 mA, 62 mV to 10V, JKERTBCNS thermocouples**
Input Impedance (current)	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA
Input Impedance (other ranges)	**200K Ohms**

Wiring

Two input terminals are provided for each measurement channel. Channel to channel isolation is provided.

4-20 mA Input Jumpers

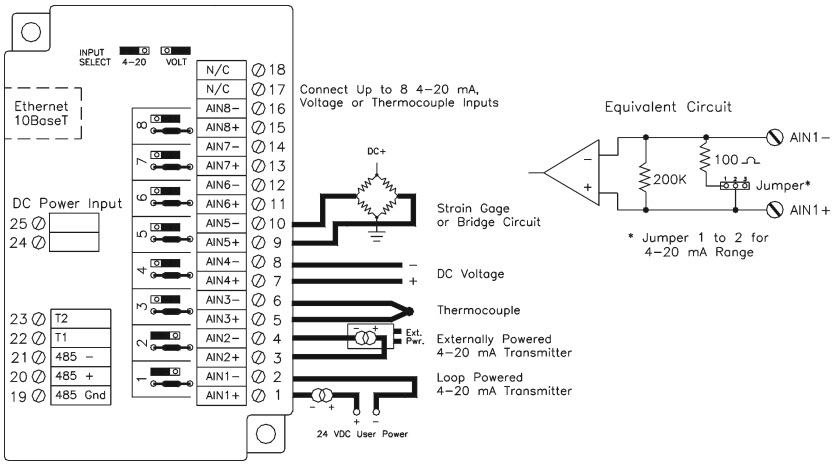
This module has a 4-20 mA input enable jumper for each channel. Set each jumper to match the desired input as shown in the diagram below. The jumper setting must match the range selection in the IO Toolkit.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any shunt that open-circuits as a result of a current overload.

I/O Registers

Function	IOtech Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008



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Analog I/O Module 8

This section documents the following module:
PointScan/108

Note: It is not necessary to recalibrate analog I/O if a logic module is replaced.

Analog logic modules may be hot swapped and will not require recalibration. User calibration data is stored in system memory outside of the analog module. Factory calibration data is stored in memory in the plug-in logic module. Since all logic modules are calibrated to the same factory standards, recalibration is not necessary if logic modules are moved or replaced.

PointScan/108 Combined Analog Input and Output Module

Overview

This module combines eight 4-20 mA analog inputs and four 4-20 mA outputs. More information can be found in the on-line help supplied with the IO Toolkit program.

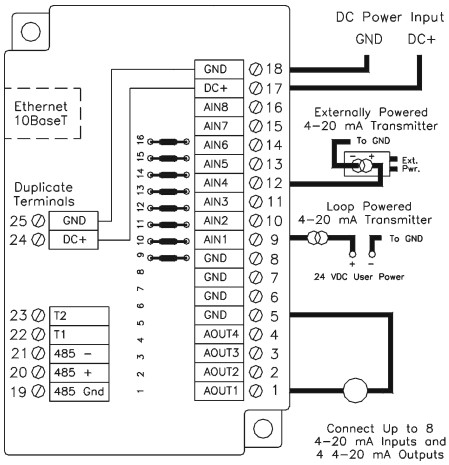
Number of Analog Inputs	**8 (14 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA
Number of Analog Outputs	**4 (16 bit resolution)**
Output Range	**4 - 20 mA**

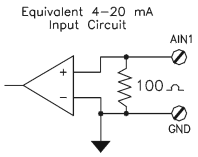
Wiring

A single input terminal is provided for each input and output channel. Care must be taken to externally provide a suitable instrumentation ground for these input and output circuits.

I/O Registers

Function	IOtech Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008
Analog Outputs	AY0 – AY3	40001 – 40004





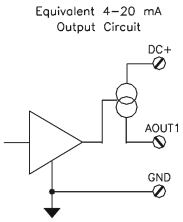


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Table PointScan I/O Modules and Accessories A

Definition	Distributed I/O Modules			Description
	Ethernet	RS-485	PT-Bus	
Analog Inputs				
8 Analog Inputs (4 to 20 mA)	—	PointScan/201	PointScan/301	Measure analog current with 14-bit resolution
16 Analog Inputs (4 to 20 mA)	PointScan/102	PointScan/202	PointScan/302	Measure analog current with 14-bit resolution
16 Analog Intputs (Current Limiters)	—	—	PointScan/303	Provides short circuit protection for 4 to 20 mA inputs
8 Universal Analog Inputs (TC, mA, V, mV)	PointScan/104	PointScan/204	PointScan/304	Measure TCs (J, K, E, R, T, B, C, N, S), floating 4 to 20 mA, or mV, V with 16-bit resolution
8 Analog Inputs (±1, 2, 5 10V)	—	—	PointScan/305	Measure voltage inputs with 12-bit resolution
6 RTD Inputs (100 Ohm Platinum)	—	—	PointScan/306	Measure 100 Ohm platinum RTDs (2, 3, or 4 wire) with 16-bit resolution
6 RTD Inputs (10 Ohm Copper)	—	—	PointScan/307	Measure 10 Ohm copper RTDs (2 or 3 wire) with 16-bit resolution
Combination I/O				
8 Analog Inputs & 4 Analog Outputs (4 to 20 mA)	PointScan/108	—	—	Provides 4 to 20 mA inputs and outputs with 16-bit resolution
4 RTD Inputs & 4 Digital Outputs (100 Ohm Platinum, 12/24 VDC/VAC)	PointScan/109	—	—	Measure 100 Ohm platinum RTDs (2, 3, or 4 wire) and digital inputs
Analog Outputs				
4 Analog Outputs (4 to 20 mA)	—	PointScan/216	PointScan/316	Provides 4 to 20 mA outputs with 13-bit resolution
8 Analog Outputs (4 to 20 mA)	—	PointScan/217	PointScan/317	Provides 4 to 20 mA outputs with 13-bit resolution
8 Analog Outputs (±5V, ±10V, 0 to 5V, 0 to 10V)	—	—	PointScan/318	Provides voltage outputs with 14-bit resolution
Digital Inputs				
8 Digital Inputs (12/24 VDC/VAC)	—	PointScan/221	PointScan/321	Read digital (ON/OFF) inputs
16 Digital Inputs (12/24 VDC/VAC)	PointScan/122	PointScan/222	PointScan/322	Read digital (ON/OFF) inputs
8 Digital Inputs (5 VDC)	—	—	PointScan/323	Read digital (ON/OFF) inputs
8 Digital Inputs (48 VDC/VAC)	—	—	PointScan/324	Read digital (ON/OFF) inputs
8 Digital Inputs (120 VDC/VAC)	—	—	PointScan/325	Read digital (ON/OFF) inputs
8 Digital Inputs (240 VAC)	—	—	PointScan/326	Read digital (ON/OFF) inputs
8 HS Counters with Encoders (32-bit, 4 to 30V)	PointScan/127	—	PointScan/327	Count rates up to 50-kHz plus quadrature encoder
Combination I/O				
4 Digial Inputs & Outputs (12/24 VDC)	—	PointScan/228	—	Read digital (ON/OFF) inputs, switch digital (ON/OFF) outputs
8 Digial Inputs & Outputs (12/24 VDC)	PointScan/129	—	—	Read digital (ON/OFF) inputs, switch digital (ON/OFF) outputs
8 Digital Inputs & 8 Analog Inputs (12/24 VDC/VAC, 4 to 20 mA)	PointScan/130	—	—	Read digital (ON/OFF) inputs, output 4 to 20 mA with 16-bit resolution
4 Digital Inputs & 4 Analog Inputs (12/24 VDC/VAC, 4 to 20 mA)	—	PointScan/231	—	Read digital (ON/OFF) inputs, output 4 to 20 mA with 16-bit resolution

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Digital Outputs				
6 Relay Outputs (120 VDC/VAC, 2A max)	—	—	PointScan/336	Dry contact relay outputs, SPDT (FormC)
8 Digital Outputs (0 to 60 VDC, 2A max)	—	—	PointScan/337	High-current control outputs with isolation
8 Digital Outputs (60 to 150 VDC, 1A max)	—	—	PointScan/338	High-current control outputs with isolation
8 Digital Outputs (16 to 140 VAC, 2A max)	—	—	PointScan/339	High-current control outputs with isolation
8 Digital Outputs (140 to 265 VAC, 2A max)	—	—	PointScan/340	High-current control outputs with isolation
16 Digital Outputs (10 to 32 VDC, 0.5A max)	—	—	PointScan/341	Low-current outputs to drive low power devices
16 Digital Outputs (10 to 30 VDC, 1A max)	PointScan/142	PointScan/242	—	High-current control outputs with isolation
8 Digital Outputs (10 to 30 VDC, 3A max)	—	PointScan/243	—	High-current control outputs with isolation
Accessories				
Field Configuration Module				PointScan/440
RS-232/RS-485 Converter				PointScan/441
Ethernet/RS-232 to PT-bus Gateway				PointScan/442
Power Supply (24 VDC @ 1A)				PointScan/443

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